THAILAND DEVELOPMENT
RESEARCH INSTITUTE
Thai agriculture

Thai Agriculture:
Resources, Institutions and Policies

Thailand Development Research Institute Foundation

THAILAND'S DEVELOPMENT RESEARCH INSTITUTE

Thai Agriculture:
Resources, Institutions and Policies

Ammar Siamwalla
Suthad Setboonsarng
Direk Patamasiriwat

INSTITUTE
OF
DEVELOPMENT
STUDIES
LIBRARY

THAI AGRICULTURE:

RESOURCES, INSTITUTIONS AND POLICIES

Ammar Siamwalla
Suthad Setboonsarng
Direk Patamasiriwat

INTRODUCTION

The Thai agricultural sector was the leading sector in the Thai economy during its crucial two decades of growth in the 1960s and the 1970s. That role has been taken over by the manufacturing sector during the 1980s, and what happens in agriculture appears to count for less as far as the macroeconomic performance is concerned. Nevertheless, it is important to look at the sector for two reasons:

- The agricultural sector still occupies a considerable number of people--something of the order of 60-65 per cent of the labor force;

- A historical account of the growth of Thai agriculture is necessary in order to understand the impact of its dynamics on the industrialization process, particularly as the sector begins to shed much of the labor force that is presently in it.

The discussion below will be divided into three parts, the first will discuss the basic economic forces that are driving the sector, with the emphasis on Thailand's comparative advantage in this sector and its various components; the second will discuss its institutional

framework of the sector; followed finally by an outlining of government policies towards it.

OUTPUT AND INPUTS

The Output Mix

The growth of Thai agricultural output has been rapid, by international standards. The rates of growth are 1.9 per cent for the period 1951 to 1958, 5.4 per cent between 1958 and 1973 and 3.9 per cent between 1973 and 1984. Much of this growth has been made possible because of the presence of large areas of unuused land.

Within the agricultural sector, the crop subsector account for about three-quarters of the total agricultural value-added, and the livestock subsector in turn accounts for about a half of the remaining. Both these shares have been approximately contant since 1960. The fisheries subsector has been gaining ground rapidly until 1980, rising from less than 4 per cent in the early 1960s to 10 per cent in the latter half of the 1970s. The share of the forestry sector on the other hand has steadily declined since 1960. It is of interest to note that the value added in both these natural-resource intensive sectors showed an absolute decline when the figures for the first half of the 1980s are compared with those for the latter half of the 1970s.

Indeed, a recurrent theme in what follows is the past dependence of Thai agriculture on the exploitation, and in some cases, even the mining of natural resources. The expansion of the crop subsector has been made possible by the clearance of forests with clearly observable

results not only on the amount of forest cover, but also on the output from the forestry sector. As these natural resources are exhausted, attempts would be made to shift from capture to culture, with varying degrees of success, as will be discussed further below.

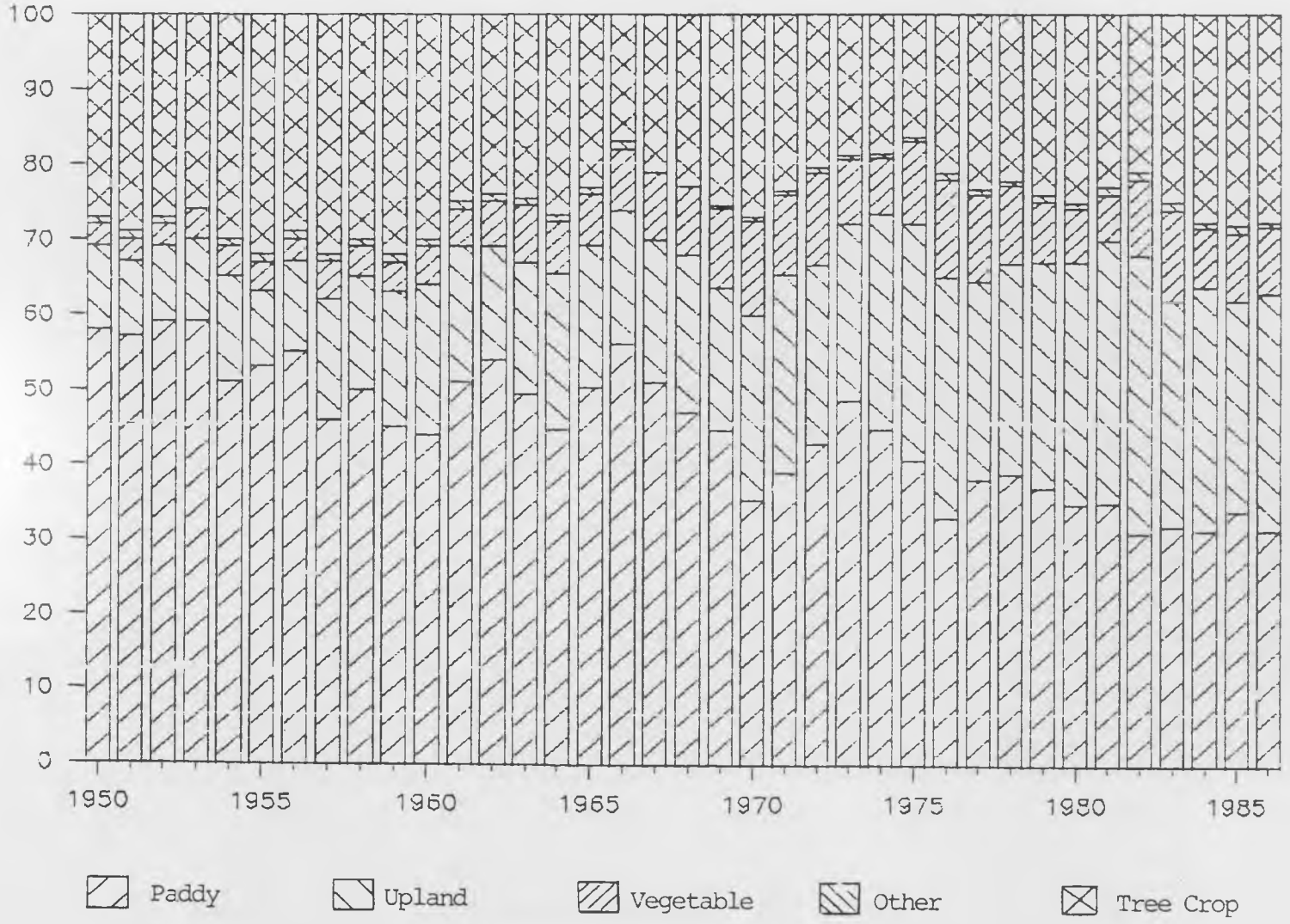
Crops: Crop production remains the backbone of Thai agriculture. Its expansion rate has been extremely rapid, peaking in the 1960s. Between 1958 and 1973, when the burst of road-building opened up vast new areas, the growth rate averaged 5.0 per cent per annum. Since 1973, the growth rate has slackened to 3.9 per cent, with much of the decline taking place in the later part of the period.

Figures 1 and 2 show the distribution of the crops grown in Thailand using two different classifications. Figure 1 categorizes the crops according to plant types: paddy, upland field crops, tree crops, vegetables and other crops, whilst Figure 2 categorizes the crops according to the nature of the markets they face: paddy, export, import-competing and non-traded crops.

As there is considerable overlap between the categories of upland and export crops. The dramatic expansion of these two categories tells different parts of the same story. The new land areas that are opened up are well-suited to grow upland crops such as maize in the early 1960s, kenaf in the mid-1960s, cassava in the 1970s, and sugarcane in the 1960s and 1970s. Most of these find their markets overseas. The trigger that set each of these crops off on its rapid expansion has been different: for maize it was the introduction of the Guatemala variety which turned out to be particularly well suited to Thai conditions, for kenaf it was the failure of the jute crop in what

FIGURE 1

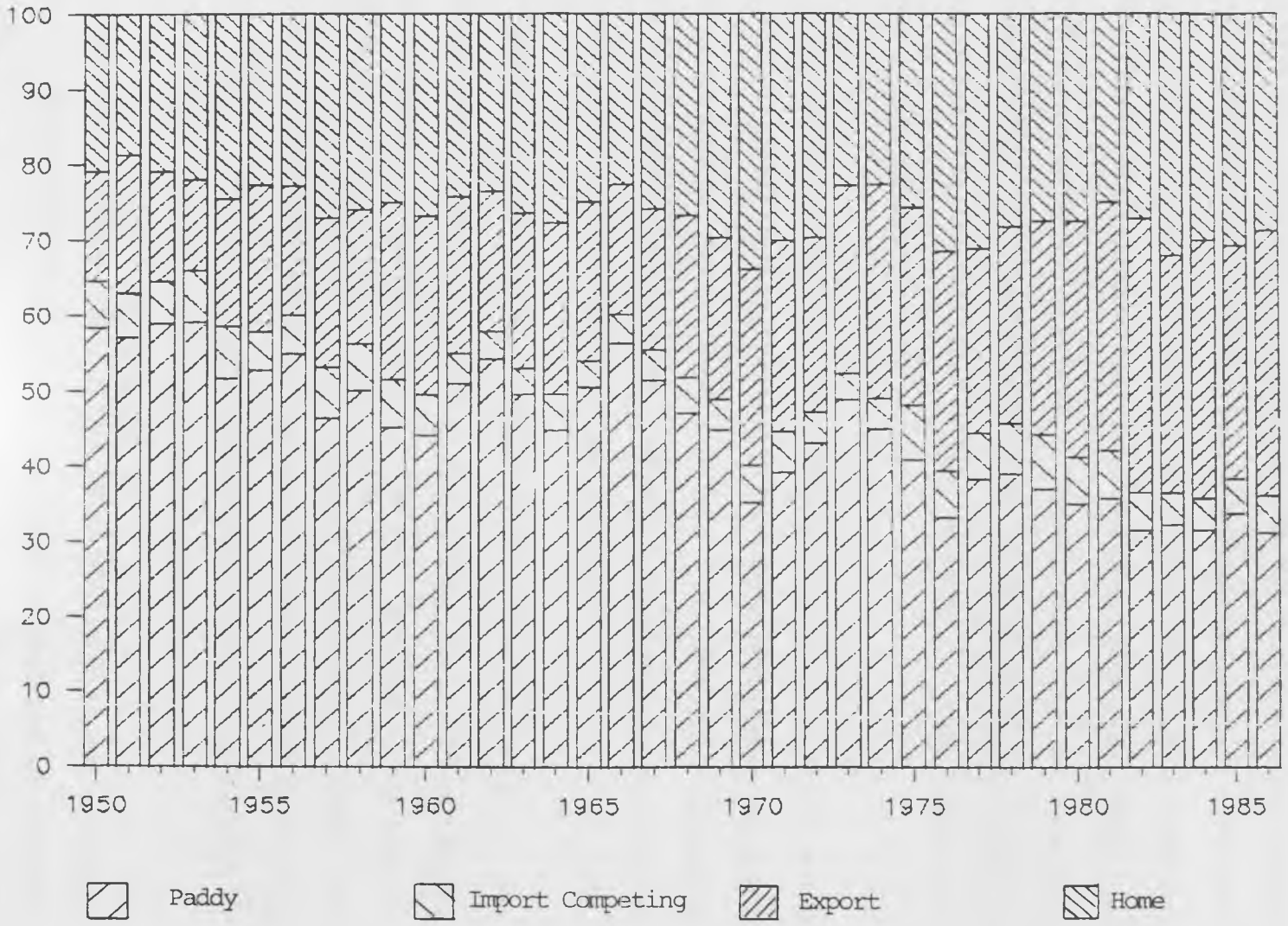
STRUCTURE OF CROP PRODUCTION BY PLANT TYPES 1950-1986
(SHARES IN VALUE ADDED AT CURRENT MARKET PRICES)



Source : National Account Division, National Economic and Social Development Board

FIGURE 2

STRUCTURE OF CROP PRODUCTION BY MARKET TYPE 1950-1986
(SHARE IN VALUE ADDED AT CURRECT MARKET PRICES)



Source : National Account Division, National Economic and Social Development Board

was then East Pakistan, for cassava it was the demand arising from the peculiar system of protection within the European Community. The case of sugarcane is slightly different: its origins have to be traced back to the import substitution policies followed from the 1950s and continued protection even after sugar began to be exported (Jessadachatr). But regardless of what triggered the boom in each of these crops, the availability of land allowed its rapid expansion, seldom at the expense of other crops.

The relative decline of the paddy sector indicates the relative scarcity of paddy land. Even here, Thailand's performance has again been an exception among Asian countries in that land expansion explains the greater part of the production increase relative to yield increases (Barker, Herdt and Rose 1985:46-50).

Among the other crops, the surprising thing to note is the constant share of the nontraded items within the crop subsector, indicating that its share in total GNP has declined. This part of agriculture is dominated by the fruits and vegetables, which are expected to be income-elastic. The slow increase in their production would suggest that there is now considerable scope for investment in this portion of agriculture to serve the domestic market.

Livestock: Dramatic shifts have taken place within the livestock sector. The postwar period saw a continual replacement of tractors for animal-drawn ploughs. The upland areas have been using tractors from the beginning. But more recently, starting around 1970 and coinciding with the introduction of second-cropping in the Chao Phraya delta, ploughing of paddy lands began to be done by two-wheeled and

four-wheeled power tillers. As the stock of buffaloes and cattle were drawn down as a result of these shifts, the total value-added of this line of activity grew slowly (Table 1). Only recently has the high income elasticity for beef in consumption begun to make an impact on domestic beef production.

Dietary changes have had a more noticeable impact on the demand for poultry products, and should have had a similar impact on swine production. Poultry production is a clear success story of Thai livestock production. The introduction of modern breed of poultry, particularly for chicken and eggs, and advanced methods of raising them and the propagation of these methods have been facilitated by large agri-businesses who pioneered the contract farming methods starting in the early 1970s. These innovations and low feed prices (Thailand has a surplus in carbohydrate feeds) have been responsible for the real decline in poultry prices and have tended to increase the importance of poultry products in Thai diets which have grown at the expense of the traditional fish. Present consumption stands at about 6.6 kg. per capita per year (Setboonsarng et al. 1989:190) In recent years increasing amounts of poultry are being exported, mostly to Japan.

Consumption of pork stands at 4.7 kg. per capita per year (Setboonsarng et al. 1989:130). Its role in the Thai diet could have been much larger, had it not been for restrictive policies followed towards the slaughtering industry (which has also adversely affected beef consumption).

TABLE 1

COMPOSITION OF LIVESTOCK, 1960-1986
(AT 1972 PRICES)

(Millions of Baht)

Year	Cattle and Buffaloes		Swine		Hens,Duck & other Poultry		Eggs		Dairy Products		Others	
	Value	(%)	Value	(%)	Value	(%)	Value	(%)	Value	(%)	Value	(%)
1960-64	1,393	35.46	1,038	26.43	952	24.24	524	13.33	7	0.17	15	0.37
1965-69	1,577	33.68	1,376	29.39	1,111	23.74	588	12.55	8	0.17	22	0.48
1970-74	1,714	29.06	1,321	22.38	1,684	28.55	1,141	19.33	12	0.20	28	0.48
1975-79	1,995	24.60	1,848	22.79	2,293	28.28	1,925	23.74	21	0.26	26	0.32
1980-86	2,067	20.06	1,901	18.46	3,171	30.78	2,950	28.64	49	0.47	163	1.58

Source : National Account Division, NESDB.

Note : Compiled by Agriculture and Rural Development Program , Thailand Development Research Institue (TDRI).

Fisheries: The marine branch of the fisheries industry was marked by a very rapid expansion in the 1960s. There was a trawler revolution and Thailand, almost overnight, became a major fishing nation on the high seas. Demersal (sea-bed) fishing grew rapidly. The motorization of fishing boats in the 1950s and the 1960s and the replacement of the bamboo-stake by the purse-seine technique led to an expansion of pelagic capture as well (Arbhabhirama et al 1989).

These intensive methods of capture naturally led to the exhaustion of the resources, and as those close at hand are wiped out, Thai fishermen ranged further afield. The increase in oil prices and the introduction of the 200-mile exclusive economic zone in the 1970s spelt an end to the rapid growth of the Thai marine fishing industry.

The story in the case of inland fisheries is similar, although here the population pressure has been the more important factor.

In recent years, the response to the exhaustion of naturally available resources has been the shift to aquaculture. Fresh water aquaculture, particularly of catfish, had a boom in the latter part of the 1970s, but came to an abrupt end in the early 1980s as a result of a severe epidemic of an apparently viral disease. There has since then been a revival but concentrating on the cultivation of fresh water shrimps.

Marine aquaculture is also enjoying a boom, with the introduction of Taiwanese technology in the raising of tiger prawns. Major investments have been made in the mangrove forest areas along the coast.

Much of the output of the marine fishery industry is exported. The value of the fisheries exports in 1988 (except canned fish--much of which is canned tuna for which the catch is brought in by foreign ships) is US$ ... million, having grown particularly rapidly from US$ 244 million in 1986.

Forestry: The depletion of Thai forests has been particularly rapid, and is in reality the reverse side of the coin from the story of rapid growth in crop production. Much of the country's timber requirements are now met by imports. The movement away from capture to culture is also evident in this sector. The Royal Forestry Department has in recent years been promoting plantations of eucalyptus (E. calmandulensis) to produce wood-pulp. Although the alleged reasons for the promotion are to reforest forest reserves that have been lost to the plough (and the tractor) and to substitute for imported pulp, an important motive for the Forestry Department is to reacquire the land back from farmers who have illegally occupied it.

Inputs

Land: No other aspect of Thai agriculture is as emotion-laden as the issue of cultivable land and its complement, forest land. Over the four decades since the second world war, the total farm land area has been steadily expanding at the expense of the forest (Table 2). Until the latter half of the 1970s, the amount of land cultivated per agricultural worker has been actually increasing. The period of the most rapid expansion has been the 1960s, when more kilometers of road were being added than probably any other period in Thai history. Another factor that made the postwar expansion qualitatively different

TABLE 2

LAND UTILIZATION IN THAILAND

Unit : Million Hectares

Year	1950	1955	1960	1965	1970	1975	1980	1982
Forest Land	31.71	29.73	28.19	26.23	23.27	20.92	16.55	15.68
Farm Holding Land	8.27	9.03	10.00	12.76	15.04	17.95	19.04	19.77
Housing Area	-	-	-	-	-	0.45	0.40	0.41
Paddy Land	5.40	5.77	6.20	6.64	9.37	11.40	11.77	11.72
Field Crops	0.73	0.76	1.11	1.98	2.25	3.19	4.12	4.69
Tree Crops	0.77	0.83	0.93	1.54	1.46	1.67	1.78	1.90
Vegetables & Flowers	-	-	-	-	-	0.06	0.05	0.05
Pasture Land	-	-	-	-	-	0.06	0.05	0.05
Idle Land	0.85	0.85	0.84	0.79	0.66	0.73	0.49	0.62
Others	0.51	0.83	0.92	1.81	1.30	0.38	0.34	0.26
Unclassified	11.33	12.55	13.13	12.33	13.00	12.44	15.72	15.86
Total Land	51.31	51.31	51.31	51.31	51.31	51.31	51.31	51.31

Sources : 1950-1974 "Land Utilization of Thailand 1950/51-1977/78"
Office of Agricultural Economics, Ministry of Agriculture & Co-operatives.
1975-1982 "Agricultural Statistics of Thailand" Crop year 1983/84
Office of Agricultural Economics, Ministry of Agriculture & Co-operatives.

from the traditional methods followed by Thai farmers in earlier times is the availability of the tractors. This has had two influences. It made the process of land clearance much easier (Moerman 1968, particularly Chapter 8), and it made the areas cultivatable by each farm family much larger than it would have been, if the farmer has to depend on draft animals. This lifting of the constraint on the amount of land that is cultivatable by each farmer probably speeded up the pace of land clearance.

Did farmers overdo it? The steep decline in forest land as a result of the increase in cultivation has been much debated in recent years, as the adverse environmental impact of deforestation has become a major item of the political agenda. Much of the land that is supposed to be "deforested" by farmers is in areas that are claimed by the Forestry Department, relying on an old law that went back to 1897. By this law, the Department could lay claim to half of the total land area of the Kingdom. The claim is grossly unrealistic from the administrative and policing point of view, and seems to be hardly justified even from the environmental point of view. The result is that the Department is unable to protect even those lands that are environmentally fragile (e.g. watershed areas), this time from loggers, while farmers in perfectly good agricultural lands are prevented from acquiring title to the lands, with adverse economic and social consequences (see discussion concerning property rights below). In any case some mapping studies by the World Bank in 1982 appears to indicate that farmers do not encroach on environmentally fragile lands--the overwhelming proportion of the land on which they have moved into, unsurprisingly, is land that is suited for agriculture.

Labor: The availability of land for clearance and cultivation has enabled the agricultural sector to absorb the rapidly increasing labor force. According to the Population Censuses, the growth of the aggregate labor force was 1.7% betwen 1960 and 1970, and 3.8% between 1970 and 1980, the jump in the 1970s being partly explained by the high birth rates in the late 1950s and the 1960s, and partly by the increase in female labor force participation.

The three censuses indicate that the agricultural labor force has been, as expected declining as a proportion of the total from 82% in 1960 to 78% and 71% in 1970 and 1980 respectively. These figures are high by international standards (Figure 3). Of course, the availability of land may have kept more of the labor force in agriculture than would otherwise be the case, but the census data which ask respondents their primary occupation, are somewhat biased upward. The bulk of Thai agriculture is rainfed and therefore does not provide year-round employment to the farmer and his family. If we examine data from the Labor Force Surveys which are conducted in two rounds every year, a different picture emerges (Table 3). Not only do many people leave the labor force altogether during the dry season, but the share of those that do stay also drops. A study of rural off-farm employment (Akrasanee et al 1983) indicates that among rural households in the North and Northeast, farm income provides less than half of the total income, in some areas actually less than a quarter. These figures may underestimate agriculture's contribution, inasmuch as a quarter to a third of their income was earned as wages, a large part of which may come from the agricultural sector.

TABLE 3

TOTAL LABOR FORCE AND THE SHARE OF EMPLOYMENT BY MAJOR SECTORS

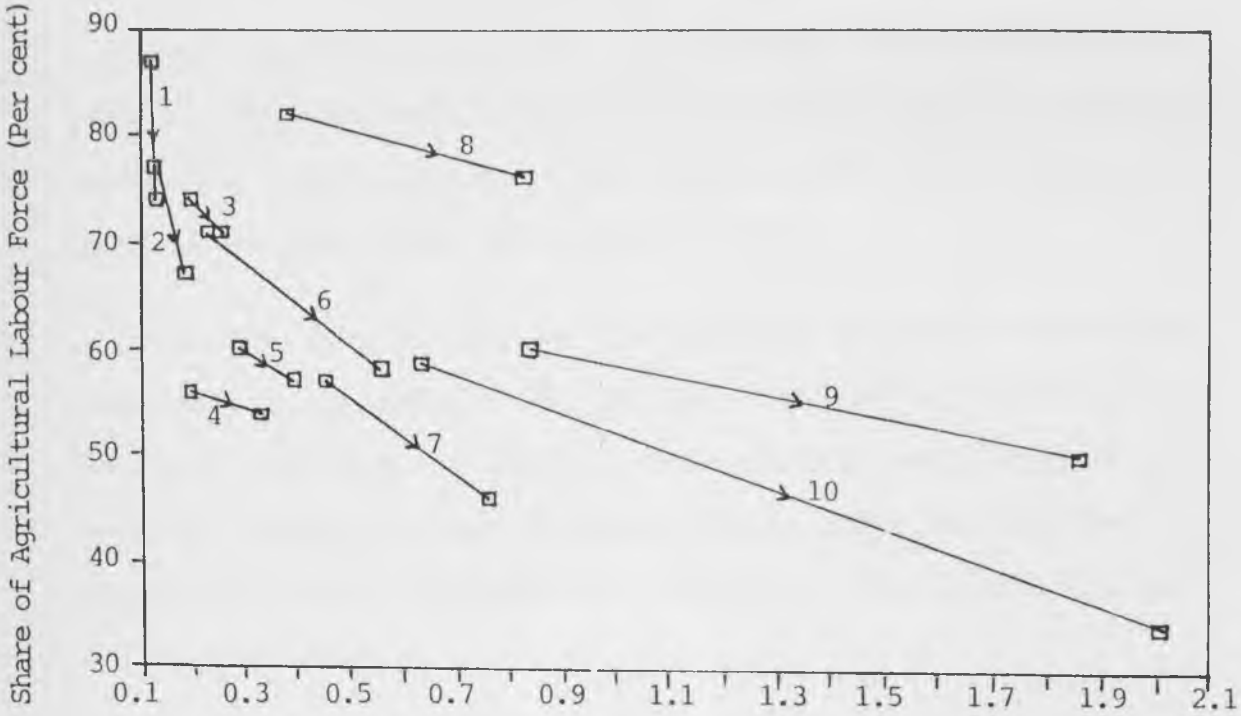
Year	Dry Season (January-March)				Wet Season (July-September)			
	Total Labor Force (million)	Agri %	Ind %	Services %	Total Labor Force (million)	Agri %	Ind %	Services %
1977	16.101	61.1	15.1	23.8	20.400	73.6	8.6	17.8
1978	16.820	63.0	13.4	23.6	21.807	73.8	8.6	17.6
1979	16.935	57.8	17.1	25.1	21.378	70.9	10.4	18.7
1980	NA[a/]	NA	NA	NA	22.680	71.0	10.2	18.8
1981	17.543	53.7	17.2	29.1	24.712	72.1	9.5	18.4
1982	18.616	52.6	17.8	29.6	25.369	68.7	10.6	20.7
1983	20.640	55.9	16.7	27.4	25.184	69.1	10.0	20.9
1984	22.321	60.0	14.9	25.1	25.999	69.7	10.6	19.6
1985	22.602	59.2	14.9	25.9				

a/ not available

Source: National Statistical Office, Labor Force Surveys, 1977-1985.

FIGURE 3

RELATIONSHIP BETWEEN THE SHARE OF AGRICULTURAL LABOUR FORCE AND GDP PER CAPITA, SELECTED ASIAN COUNTRIES, 1965 - 1983



GDP per capita (US$)

1. Bangladesh
2. Burma
3. India
4. Sri Lanka
5. Pakistan
6. Indonesia
7. The Philippines
8. Thailand
9. Malaysia
10. Korea

Intial Point: 1965 End Point: 1983

Source: The World Bank, World Development Report, 1985

A conclusion that may safely be drawn that the 71% of the labor force said to belong to the agricultural sector by the 1980 Census is somewhat exaggerated, even for that year. A figure somewhat less than two-thirds for the mid-1980s would probably be nearer the mark. This figure is derived from the wet season average from the Labor Force Surveys. This would make the Thai figures somewhat closer to the 1965 figures for Malaysia, another land-surplus country whose income at that time was about where Thailand was in 1985.

Over the decades, the amount of schooling that Thais receive has been steadily increasing. The results of this effort put in by the Thai state are shown in Table 4. The expansion, particularly of the number of people who have finished primary schooling has had a considerable impact on productivity growth in Thai agriculture, as will be shown below.

Public capital: Expansion of agricultural production in the past has been accompanied by a heavy investment in public infrastructure. We have often alluded to the role of roads in the opening up of new lands. More directly, the government has also invested heavily in irrigation. Between 1950 and 1984, it has poured altogether US$3.6 billion (at 1984 prices) in various schemes all across the country, with the bulk going to the Chao Phraya delta, the country's premier rice-growing area.

The pace of investment in irrigation has slackened off recently, partly because of the increasing cost of irrigation, as the easier sites have been already developed, and partly because of the declining

TABLE 4

POPULATION AND EDUCATIONAL LEVEL

(Percent of population in the age group)

Age	MALES							FEMALES						
	No Education	Completed less than 4 years	Completed 4 years	Completed 5-9 years	Completed 10 years	More than 10 years Education	Other Studies	No Education	Completed less than 4 years	Completed 4 years	Completed 5-9 years	Completed 10 years	More than 10 years Education	Other Studies
			1960								1960			
6-10	59.54	37.89	1.52	0.24	0.00	0.00	0.81	59.61	37.77	1.66	0.23	0.00	0.00	0.73
11-14	8.13	38.02	40.33	13.20	0.02	0.00	0.30	10.90	33.96	45.20	9.72	0.02	0.00	0.19
15-19	9.25	11.73	58.90	14.49	3.27	1.22	1.14	14.44	11.20	63.49	7.53	2.14	1.01	0.19
20-24	12.62	14.63	58.70	4.31	4.64	3.52	1.58	21.23	14.52	58.30	1.84	1.86	1.94	0.31
25-29	16.06	15.10	58.49	3.78	2.95	2.15	1.47	25.61	15.20	54.99	1.88	0.99	1.01	0.33
30-34	16.62	14.54	56.59	5.44	3.22	2.03	1.55	30.98	15.85	48.26	2.69	1.10	0.78	0.34
35-39	25.03	16.35	44.64	7.00	2.90	2.22	1.87	50.97	14.57	30.30	2.30	0.77	0.68	0.40
40-44	36.99	15.80	34.72	6.33	1.58	1.94	2.64	69.83	10.73	16.93	1.28	0.31	0.44	0.48
45 & over	60.10	12.59	19.72	3.14	0.68	0.99	2.77	90.62	3.43	4.83	0.47	0.11	0.12	0.41
15 & over	27.37	13.96	45.79	6.23	2.66	1.92	1.88	45.63	11.16	38.45	2.54	1.04	0.84	0.34
			1970								1970			
6-10	46.59	48.20	3.18	0.34	0.00	0.00	1.70	46.49	48.04	3.54	0.35	0.00	0.00	1.62
11-14	4.23	23.37	52.37	19.15	0.05	0.01	0.82	6.09	20.31	57.44	15.36	0.05	0.01	0.74
15-19	4.67	4.32	67.71	15.24	4.15	2.86	0.95	7.65	4.26	71.62	10.19	2.95	2.61	0.73
20-24	5.58	4.52	68.97	6.25	6.82	6.21	1.65	9.94	4.71	71.08	4.00	4.14	5.04	1.08
25-29	7.79	6.11	67.16	4.34	7.14	5.25	2.21	14.64	6.97	68.06	2.16	3.23	3.55	1.39
30-34	11.36	9.12	65.65	3.05	4.38	4.65	2.39	21.00	10.39	61.75	1.47	1.43	2.28	1.69
35-39	13.70	9.42	64.94	3.16	3.08	3.00	2.71	23.67	10.60	59.95	1.69	0.99	1.25	1.85
40-44	15.94	10.04	59.70	4.45	3.46	3.20	3.19	33.26	11.75	48.25	2.27	1.20	1.22	2.05
45 & over	43.38	11.29	31.57	4.21	1.55	2.01	5.99	75.58	5.94	13.98	0.93	0.37	0.47	2.73
15 & over	17.11	7.78	57.93	6.48	4.12	3.66	2.95	30.98	6.99	52.53	3.57	2.00	2.25	1.68
			1980								1980			
6-10	33.63	58.08	5.23	1.16	0.00	0.00	1.88	33.20	57.82	5.80	1.28	0.00	0.00	1.89
11-14	2.52	18.55	35.36	42.11	0.20	0.01	1.25	3.22	15.79	39.01	40.67	0.20	0.02	1.09
15-19	2.57	3.29	47.12	28.77	9.68	7.55	1.03	3.95	3.00	54.18	22.71	7.22	8.23	0.71
20-24	2.89	2.54	58.75	8.87	9.83	15.63	1.48	4.98	2.70	65.84	6.52	4.44	14.55	0.97
25-29	3.66	2.46	67.35	6.49	7.40	11.49	1.15	6.60	3.03	71.97	5.05	3.39	9.26	0.70
30-34	4.61	3.26	68.61	5.44	8.18	8.58	1.26	8.53	4.16	72.59	3.71	4.01	6.24	0.75
35-39	6.61	4.98	68.12	3.84	7.85	7.28	1.32	12.63	6.31	70.74	2.02	3.18	4.37	0.75
40-44	9.84	7.57	67.82	2.74	5.06	5.45	1.53	18.26	9.30	66.16	1.39	1.59	2.47	0.82
45 & over	27.49	8.45	52.00	3.69	3.01	3.02	2.32	48.92	8.05	38.37	1.36	0.84	0.99	1.47
15 & over	10.00	4.80	58.38	10.00	7.11	8.19	1.52	18.35	5.14	58.39	7.06	3.54	6.55	0.96

Source : National Statistical Office, 1960 Population Census., 1970 and 1980 Population and Housing Censuses.

price of rice. Indeed, since 1983, large-scale irrigation projects have all but ceased to be implemented.

Questions have been raised with respect to irrigation investments in Thailand. In most of the ex post analyses, the productivity of irrigation investments have been on the low side. Small and Mongkolsmai have estimated the rates of return to be of the order of 3 to 5 per cent, but these computations were made in the early 1970s when dry-season cultivation of rice was just beginning to take off. Our own estimates for the growth accounting exercise below found very little impact for irrigation.

The utilization of the public capital embodied in the irrigation structures remains relatively poor. Not that it is underutilized--on the contrary, the main constraint to dry-season rice production is the amount of water that could be stored during the monsoon in the main storage dams. Rather, the problem is its specificity. Most of the structures were designed to produce rice, while actual cultivation in the Central irrigated areas has moved considerably away from rice. Better utilization of these structures will have to await investments that will make the system somewhat more sophisticated.

Private capital: Thai farmers have over the years made long-term investments in the clearance of new lands, in land development (e.g.levelling), in planting perennials, in livestock and lately in machineries. Little data exist on the total size of these investments, and how they compare with the major public works discussed above. Looking at the factor shares in the cost of production for crops estimates provided by the government, it is

remarkable how small the share of capital is (typically less than 10%). Of course the share would be larger for the livestock and fisheries subsectors.

New Technology: Each individual crop grown in Thailand has undergone relatively little technological change. By and large, there is little application of what is conventionally regarded in the rest of Asia as modern technology. There is little use of modern high-yielding varieties of rice, for example, and the rate of fertilizer application is well below that in most of the rest of Asia. Only in the use of machineries are Thai farmers somewhat ahead of their brethern in the rest of Asia. The outcome is that agricultural yields in Thailand in general lag behind other countries.

To look at technological developments at the level of each individual crop is to underestimate the technological dynamism displayed by the Thai farmer during the last three decades. While he haas used age-old techniques to grow any particular crop, he has also been adopting new crops with speed, aided by the availability of abundant land resources. And it is this same abundance of land resources that he has been slower to intensify his practices. But it must be remembered that acceptance of a new crop is no less an innovation than acceptance of a new technique or a new variety.

The government has expended resources to promote technological change, at least for the crop subsector. The amount put in has however not been as large as it could be. In this respect, Thai agriculture has suffered the misfortune of its success, at least as far as its competitiveness in the world markets. Because Thailand

exports most agricultural commodities, there is not a sufficiently strong impulse for the government to invest in research, unlike in India and Indonesia where the drive to attain self-sufficiency has impelled their governments to put in large resources to research and promote new technology. It is interesting to note that import-substituting crops have claimed relatively more research money than export crops such as rice or maize (Table 5).

Among the export crops, the research system has not been instrumental in introducing new crops (see following paragraph). But once a crop has proved its commercial success, the research budget would tend to expand pasi passu with its importance in the economy (Setboonsarng). This behavior indicates that an important motive of the government to promote productivity of the farmer is to increase his income, rather than to protect the competitiveness of the particular crop. In this sense, research policy has followed rather than led comparative advantage.

The key player in introducing new crops has been the private sector, but once a crop has been thus introduced, it has not been active in researching new technology to grow that crop. Even in the poultry sector, where the private firm has played a dominant role, the domestic firms have mostly been the conduit for technology produced by foreign multinationals. Only recently have hybrid-maize seed firms begun to conduct research of their own (Setboonsarng, Wattanutchariya and Puthigom 1988), and much of that work has capitalized on the success of the Suwan varieties--a success of the public sector research.

TABLE 5

Research Expenditure per 100 Baht of Crop Value

Crops	1987	1988
Exportable Crops		
Rice	0.49	0.37
Rubber	0.46	0.54
Maize	0.52	0.20
Tapioca	0.20	0.18
Sugarcane	0.43	0.23
Mungbean	0.88	0.74
Sorghum	1.01	0.77
Importable Crops		
Soybean	0.79	0.66
Oil Palm	0.72	0.46
Cotton	4.35	2.30
Groundnut	1.20	2.30

Source: Setboonsarng and Khaoborisuth (forthcoming), Research Budget Allocation of the Department of Agriculture, Discussion Paper for the Research Priorities in Thai Agriculture Project, Department of Agriculture, Thailand Development Research Institute (TDRI), Australian Centre of International Agricutural Research (ACIAR) and International Service for National Agricultural Research (ISNAR).

Not to be omitted are the Thai farmers' trial-and-error methods that they have been practising for millennia. These have been a key component of advance in the horticultural sector, and more recently in the swine industry.

Growth Accounting

The following reports on a growth accounting exercise that was conducted only for the crop sector. The implicit model behind it is based on the following equation:

$$\ln y/n = \beta_0 + \beta_1.\ln p + \beta_2.\ln p_f + \beta_3.\ln h/n + \beta_4.\ln k/n + \beta_5.\ln s + \beta_6.\ln r.\ln i + \beta_7.\ln z_1 + \beta 8.\ln z_2 + u \quad (1)$$

where y = index of output,

n = agricultural labor force,

p = index of output prices,

p_f = fertilizer prices,

h = cultivated area,

k = index of capital stock,

s = average number of years of schooling,

r = cumulated national research expenditures,

i = cumulated irrigation expenditures,

z_1 and z_2 are two indicators for rainfall (not used in the growth accounting exercise below, and

u = random term.

The model is run against provincial level data for the period 1961 to 1985, in other words we have a panel data consisting of

provincial-level observations for all the variables, except research expenditures whose output is regarded as a public good, accessible to all provinces. The details of the estimation are given in Patamasiriwat and Suewattana (1990), we give below a brief explanation concerning the economics behind the assumptions that are made.

Essentially this is a supply function, hence the presence of output and fertilizer prices. However, we also assume that in each year, the quantities of land and labor are fixed for each province, as a historical given, hence the presence of these variables in the equation above. Actually the equation above is part of a larger model which explains changes in these factor quantities from one year to the next, but this will not be reported here.

The estimated equation gives us the means to estimate the sources of growth of output per capita during the period 1961-1985. The result of the exercise is given in Table 6. Because we consider the end of the land surplus in the late 1970s to be an important watershed, we have also reported the growth accounting exercises for the two subperiods before and after that watershed.

The most striking, and surprising, result is the major role played by schooling in explaining the productivity increase in agriculture. This result appears to be very robust against different specifications of the equation. Considering that much of the increase in schooling took place at the primary level, the result does show that at this level, there is considerable impact on productivity.

TABLE 6

Output Growth per Capita and its Sources
(Per Cent per annum)

Sources	1961/63 to 1976/78	1976/78 to 1983/85	1961/63 to 1983/85
Output Growth per Capita	3.13	1.38	2.41
Attributable to:			
Output Price	0.19	-0.61	-0.06
Fertilizer Price	0.27	0.16	0.24
Land per labor	0.90	-0.50	0.47
Capital per labor	0.59	0.43	0.53
Schooling	1.17	1.12	1.10
Research and Irrigation	0.51	0.01	0.39
Unexplained residual	-0.50	0.76	-0.26

Source: See text.

A somewhat more obvious result, in view of what we have said earlier, is the role played by increases in per capita land availability. The contrast between the period before 1976/1978 and the period thereafter should be noted.

We have tried to measure the impact of agricultural research and irrigation, and found their sizes to be relatively small. We would like to add that the result reported in Table 6 is not very robust, and is obtained against much experimentation with various specifications other than the multiplicative interaction as stated in equation (1) above. The rationalization of this particular specification is that the impact of research is felt only in irrigated areas. We would also conjecture that the main result of irrigation in Thailand has led to a substitution of rice for other crops, but has not led to much aggregate increase in productivity.

A specification involving a trend term appears to be insignificant. Nevertheless the shift in the values of the unexplained residual between the first and second period (mostly the effect of u in equation (1) above) should be noted. Although the figures do not warrant this, we would still speculate that in the more recent past, as land has become scarcer, a more intensive technology is being adopted by Thai farmers.

INSTITUTIONS

Property Rights in Land

Among Asian countries, Thailand is probably unique as far as the nature of its property rights problems in land is concerned. It might

have been thought that the abundance of land would make the land distribution in Thailand more egalitarian than in the more overcrowded parts of Asia. This is to some extent true. While tenancy is widespread in some of the older rice-growing parts of the Central plains and in the Northern valleys, in the Northeast and in the newly settled areas fringing the Central plains, the incidence of tenancy is quite small (Table 7).

The more severe problem faced by Thai farmers is rather that they do not have clear title to the land they till. As many as a million farm-households (out of a total of some five million) are technically squatters of land which the government claims is the nation's forest reserve. At least 30% of the land outside the reserves occupied by these farmers has for a long period not obtained a clear collateralizable title to the land. The statistics cited here (mostly from TDRI 1986) are couched in vague terms, for the simple reason that there is no firm set of data on which to make a more precise statement. Partly, the situation is so dynamic that there is difficulty in making up-to-date estimates. More seriously, there appears to be a lack of interest in having clear sets of estimates. Thus the agency responsible for issuing the three types of clearly collaterizable land titles (the Land Department) cannot even give an exact answer to the simple question: how much land do all the titles it has ever issued cover?

The consequence of this past lackadaisical performance on issuing clear land titles appears now on two fronts. The first is on the issue of land conservation. Because there are now a large number of

TABLE 7
Land Holdings, classified by types of tenancy, 1983

	NORTH		NORTHEAST		CENTRAL		SOUTH	
	'000	Percent	'000	Percent	'000	Percent	'000	Percent
TOTAL LAND HOLDINGS ('000 Rais)	27,940	100.0	53,061	100.0	27,950	100.0	14,280	100.0
Owner-occupied	21,490	76.9	48,732	91.9	20,025	71.7	13,281	93.0
Rented	4,118	14.7	2,099	3.9	7,075	25.3	586	4.1
Others (incl.mortgaged, rented free, etc.)	2,332	8.4	2,231	4.2	850	3.0	412	2.9
NO. OF FARM HOUSEHOLDS ('000) (1982)	1,236	100.0	1,946	100.0	879	100.0	624	100.0
Renters (1982)	259	20.9	134	6.9	310	35.3	92	14.8

SOURCE: Office of Agricultural Economics, Ministry of Agriculture and Agricultural Cooperatives, cited in TDRI (1986). Figures slightly amended for consistency.

people who are technically squatters on the government's forest land, the government has found it difficult to enunciate a clear and acceptable set of policies on forestry and conservation. On the one hand, public opinion appears to favor a strong pro-conservation policy for the forests, but on the other it would not tolerate a policy of eviction towards the squatters. In 1985, the government formulated a forestry policy which seems to follow the worst aspects of both alternatives (see the policy section below).

The second consequence appears to have been on agricultural productivity. Here we have some very strong and empirically well-supported arguments made by Feder et al. (1988). They show that the lack of land titles does not lead to less security in land tenure. In general, even on forest reserves, the probability of farmers without land titles being evicted from their land is quite low, although not quite zero. Indeed there is an active market in land without titles. Consequently, the impact on agricultural productivity through this pathway is negligible. However, when the land that farmers hold cannot be placed as collateral for long-term loans--and long-term loans even from informal sectors do require collateral, then farmers are unable to make investments in land or even equipments. This clearly has an impact on agricultural productivity. Through this pathway, land with titles sometimes fetch as much as double the price of land without titles (Feder et al 1988:93), although the social discounted value of the additional productivity is somewhat less, although still substantial at about 50%. In areas where the credit markets seem to be particularly active, this premium on titling is much less (Feder et al 1988: 142-3).

Other factor markets

Labor markets: As with agriculture everywhere, labor demand is highly seasonal. As much of the supply labor is also from rural households, the supply is also highly seasonal. Much exchange of labor among farm households takes place. In the past such exchange has been in the form of barter among households within a village. Such practice has rapidly declined, apparently for two reasons. The first reason is that the rural economy has become more monetized, the transactions cost can therefore be reduced by using money instead of inter-household labor debt. Secondly, the rhythm of agricultural work within a village has become more synchronized, certainly within irrigated villages, but also within some cash-crop growing villages; consequently, farmers have to range beyond their villages in order to procure labor. Such outside labor can only be hired on cash-wage basis.

The expanded demand for hired labor is partly met by landless households, but the proportion of landless households in Thailand is still relatively small (Table 8). Much of the demand for hired labor is met by other farm households, with the Northeasterners being notably in a position of excess supply, and the Central region farmers (particularly sugarcane farmers who usually farm very large areas ranging upto 500 hectares) in a position of excess demand most of the time. Considerable seasonal migration takes place to match these gaps. The sugarcane harvest alone requires the presence of 200,000 additional hired hands from the Northeast (Busayawit 1978:20-21, adjusted for the expanded production since then). Where considerable

Table 8 Percentage of the Landless, Near-landless and Small Farmers

Area	Type of Farmers				
	Landless[a]	Near-landless[b]	Small[c]	Other[d]	Total
Selected Provinces[e]	10.59 (92,034)	3.25 (28,287)	4.53 (39,354)	81.63 (709,469)	100 (869,144)
Upper North[f]	13.48 (12,245)	31.37 (28,511)	27.51 (25,002)	27.64 (25,116)	100 (90,874)
Lower North and Some[g] Parts of Central Plain	10.11 (74,977)	8.16 (60,503)	9.61 (71.275)	72.12 (534,948)	100 (741.723)
East and Some Parts[h] of Central Plain	13.03 (39,802)	7.4 (22,593)	7.86 (24,006)	71.71 (218,973)	100 (305,374)

Figures in parentheses are the estimated number of farms from the survey.

Notes: a. Those who do not own any land (excluding homelot) and do not rent any land from other people. They are mainly farm labourers.
b. Those who own less than 5 rai of land and have a net cultivated area of not more than 5 rai (including own land and rented land).
c. Those who own less than 10 rai and have a net cultivated area of not more than 10 rai.
d. Other means those holding over 10 rai of land.
e. the survey, conducted in 1979, covered 3 provinces in lower North, one in the Northeast (Khorat), and 8 provinces in the Central Plain.
f. 1981, covered 8 provinces.
g. 1982, covered 13 provinces (3 in lower North).
h. 1983, covered 9 provinces (6 in Central Plain).

Source: Agricultural Land Reform Office assembled by Arbhabhirama et at. (1987: Table 2:11)

amount of transactions take place, as in this case, sophisticated method of forward labor contracting (involving a nominally interest-free advance by the employer) has been devised to ensure that adequate labor will be forthcoming at harvest time (Siamwalla 1990).

In the Central paddy-growing irrigated areas, on the other hand where (a) farm sizes are relatively small and (b) the labor requirement among neighboring areas is almost simultaneous, a considerable amount of the farmer's management skill has to be devoted to planning his precise labor requirements, and to acquire knowledge about neighboring areas' requirements so as to be able to acquire the labor when the need arises.

This sketch of the intra-rural markets should be sufficient to indicate two essential points: firstly, we can safely jettison the simple version of the surplus labor hypothesis, namely that a certain amount of it can be removed from the agricultural sector for year-round employment elsewhere without any impact on agricultural production, and secondly, on the other hand, it is possible that considerable disequilibria could exist in the rural labor markets, as there is very little systematic conveying of information between areas that are temporarily in surplus and those that are in deficit (see particularly Sussangkarn's paper in this volume). It is because of these disequilibria that considerable geographical inequalities exist in incomes. Thus, because of these inequalities the average landless household's income in the Central region ends up being higher than an owner-occupier's income in the Northeast (Siamwalla and Na Ranong 1990).

Credit markets: In rural areas, credit has been traditionally provided by informal lenders, from within the village by better-off farm households or by individuals on fixed incomes (e.g. public school teachers) and from outside the village, mostly by traders. The government has had a long history (since 1916 in fact) of trying to replace these lenders who are accused of charging exorbitant interest rates. Only with the setting up of the Bank for Agriculture and Agricultural Cooperatives (BAAC) in 1969, has the government acquired an institutional basis to make inroads into the informal sector's role in the rural credit markets--the earlier dependence on cooperatives having been consistently unsuccessful. An additional boost was given by the policy announced in 1975 forcing the commercial banks to lend a proportion of its portfolio to the agricultural sector. As a consequence of these policies, the share of the formal sector loans provided to farm households has gone up from about 10% in the 1960s to something closer to a half in the 1980s (Siamwalla 1990).

Both the informal and the formal sectors appear to have been successful in meeting the short-term credit needs of the better-off and middling farmers. Long term credit from both these sources is relatively rare and invariably entails putting up land as collateral.

There do exist many market devices which substitute for credit. Thus large tractors have been sometime acquired (frequently on hire-purchase) by better-off households, and then leased for custom-ploughing by the other farmers. In the case of the modern livestock sector, large agribusinesses have been providing capital to the farmers at the start of their career. Another financial source for

the rubber growers is the Rubber Replanting Fund, which provides a grant to farmers wishing to replant their trees. The "repayment" is in the form of a cess levied on all rubber exports. But these examples are mostly in the nature of ad hoc solutions to the basic absence of long-term credit. As Thai agriculture becomes more capital-intensive, the absence of long-term credit institutions would work against farmers who do not have titled land.

Output markets

Internal trade in agricultural products in Thailand has been generally free from government intervention. As a result the organization and institutions connected with this trade has evolved over the decades in response to the market pressure and the traders' own needs. The elaboration with which the marketing institutions have evolved varies across different commodities and depends on certain factors connected with the processing technology, the perishability of the products, and the requirements imposed by the final consumers (Siamwalla 1978). We may divide teh market organizations for the products of Thai agriculture into two types: arms' length markets and contract farming systems. This is a broad categorization: some markets have mixed characteristics.

Arms' length markets: Most major commodities are traded on arms' lenth basis, starting from the farmers through myriads of middlemen through processors and so on down the chain to exporters or final consumers. With the expansion of the market, there would be increasing differentiation of the functions, although it is typical for a middleman to deal in many commodities: this is the seasonality

is even stronger in the trade of agricultural products than in their production. Traders therefore find it worthwhile to handle many commodities.

At the farmgate level, a farmer usually deals with middlemen in the district towns, or if a processor is close by, he may deal directly with him. In most arms' length markets, the farmer is generally not tied to any particular middleman, but will switch from one to another depending on the prices offered. Exceptions occur in the cases of rice in some poorer areas and maize, where credit ties will cause farmers to stick with one buyer.

Further along in the marketing chain the markets are efficiently organized (Pinthong 1977 gives a good account of the rice trade). For each commodity, there is typically a central wholesale market where buyers and sellers converge in an informal auction market. Alternatively, where processors or silo facilities are concentrated, they would post up prices which become the market information that is passed along the chain. The information role in the Bangkok wholesale trade (e.g. for rice for exports) is undertaken by brokers, with whom upcountry millers and traders are in constant communication, nowadays by telephone.

Despite allegations to the contrary, research into this type of markets has consistently failed to find evidence of any substantial monopsonistic or monopolistic element (Siamwalla 1978). A more sophisticated, and probably more valid, charge could be brought against the present marketing system is that it pays insufficient heed to the quality of the product. Thus, for a long time, the cassava

trade was plagued by problems of adulteration. It is noticeable that in this and in other cases, as the markets are given time to evolve, the problem tends to disappear. Thus in the case of cassava, traders began the practice of pay a differential price for the cassava roots according to their starch content. The fancier rices have always had a separate marketing channel, from the less differntiated export rice. However this natural evolution takes time to develop and may not be appropriate for international trade in high-valued horticultural products.

Contract farming: In the last few decades, a new mode of handling certain agricultural products has emerged, e.g. in sugarcane, tobacco and poultry. The specific circumstances that give rise to such transactions vary. They range from the scheduling needs of the processors (sugarcane) to the need to control the particular variety to be delivered to the overseas market (tobacco). The success of these arrangements in promoting technical change, for example in the case of poultry, and the fact that many such arrangements appear to reduce the price risk for the farmers have led many to advocate the expansion of this type of arrangement to other products. Furthermore, where quality is an important consideration, it appears that such types of transactions can convey information regarding consumer preferences better than can arms' length markets.

However, there is little understanding of the reasons for the emergence of contract farming in any given branch of agriculture (see Siamwalla 1978 for an attempt). Without a careful analysis of the situation, introduction of contract farming runs a severe risk of

failure. Thus early pineapple canneries thought they could mimic the arrangements prevalent in the sugar industry, only to find themselves running huge losses from contract defaults by the farmers. In more recent times, a number of analysts have raised questions regarding the burden of risk borne by farmers, particularly in the case of exotic crops or new technologies introduced by the contracting firms.

Local Economic Institutions

Agriculture is probably the most space-intensive of all economic activities. As such there would appear to be considerable scope for local public goods to contribute to agricultural production. The role of local (i.e. village-level) institutions has not been much studied by economists. From studies made by noneconomists and economic historians, it appears that local economic institutions play a relatively small role in agricultural production. In this respect, the Thai experience contrasts with those of East Asia. Furthermore whatever role there was has been diminishing rapidly in recent years. The reasons for the diminishing role of local economic institutions are as follow:

Firstly, Thai agricultural systems, except in the upper Northern provinces, do not depend much on communally constructed and maintained irrigation systems. The irrigation systems that have come into existence in the Central plains are constructed and maintained by the State. Even though the problem of allocation could have given rise to a communal organization, a system of de facto rights have developed instead which gives absolute priority to upstream farmers. Even in the North, the communally built and maintained systems are now being

replaced by more permanent structures constructed by the State. The traditional systems with its heavy maintenance requirements were the focus of sophisticated communal organizations which levy labor contributions from among the beneficiaries.

Secondly, local security was traditionally a local matter, from the point of view of practical necessity. With improved transport and communications, the State's presence in the villages was no longer as fitful as in the past. The need for village solidarity against outsiders has weakened.

The third reason, not entirely independent from the second, is that there is little direct taxation on Thai farmers. The overwhelming majority of them earn too small an income to be subject to the income tax. Land taxes are very light (incidentally also a reason for the State's lackadaisical performance in assigning property rights in land). There was thus no need for a village-level collective apparatus to handle the State taxation, such as existed in pre-colonial Vietnam.

The absence of local economic institutions partly explains the ease with which the forest areas surrounding villages have been cleared for cultivation. Traditionally, until a given piece of land is cleared for cultivation, the land is considered as communal property, to which all villagers have access. Once someone clears the land, it is generally recognized as his. When land was plentiful, this traditional practice did not require elaborate organization or formal rules. As land became scarce during the last decade, there was thus nothing to prevent massive encroachments by individuals inside

the village or by government officials or a coalition of both. The question of village common land became another layer in the complicated land issue.

However, one local institution is economically important evem though it does not directly contribute to agricultural production, namely the village temple. Temple building in Thailand is financed by local contributions, and there is a lay committee that oversees its finances. Because the temple is sometimes the only functioning village-level financial organization, villagers themselves and many development agencies have latched on to it to promote and operate communal activities.

POLICIES

Thai government policies have significantly affected the agricultural sector through four different instruments: through its attempts to manipulate land use; through its expenditure policies, particularly on irrigation and research; and through its pricing policies.

Before we discuss each of these policies in turn, it is important to point out that the Thai political system has not had an articulated set of policies towards the agricultural sector as a whole. Where pronouncements on such policies have been made, for example, as in the development plans, those policies have not been significant or have not been carried out (except irrigation), but in any case they were not considered in tandem much more powerful measures applied to agriculture, for example, the export taxes and restrictions.

Land and land use policies: The account given above has pointed out the complexities of the land problem in Thailand. The government's main sin in the past have been one of omission than of commission. Essentially, it has failed to set up a clear procedure to grant property rights to a great deal of the land that was perfectly well-suited for agriculture, and which was taken over anyhow by the farmers for that purpose. Now that farmers have occupied these lands, in its attempt to resume control over them, the government has now decided to shift from the sins of omission to the sins of commission.

The premise of the land policies announced in 1985 was to reverse the feared environmental damage created by the continual deforestation that was taking place. The problem was to place some of these deforested lands back to forest cover. The government defined two categories of forest land: natural forests and economic forests. The natural forests were defined entirely on the basis of environmental considerations (e.g. areas with steep slopes, watershed areas) and were to cover about 15 % of the total area of the country. Where these have been denuded, the Royal Forestry Department (RFD) was itself to do the replanting. On the other hand, the economic "forests" were to be planted to tree-crops. From the way the policy was to be later implemented, it appears that no environmental consideration was involved in the decision to have the figure of another 25% of land devoted to economic "forests". It turns out that the method used to calculate the area to be put under economic "forests" was calculated using estimates of demand for tree-crop products such as rubber, fruit, oil-palm and timber, and requiring

that that demand is to be met entirely from domestic sources without any imports.

The central motivation of this set of policies is the attempt by the RFD to reacquire control over the lands which were occupied by farmers, illegally in the eyes of RFD. The RFD is willing to issue these farmers with nontransferable (and therefore noncollateralizable) occupancy certificates, provided they use the land in the manner prescribed by it, namely to plant tree crops. More pointedly, the RFD could allow private companies to lease, at a nominal rent, the land that it claims (but which may already be occupied by what it calls "squatters") and use it to grow specified fast-growing trees. In the last few years the crop of choice is Eucalyptus calmandulensis, which is considered highly suitable to produce paper pulp. In recent years, the expansion of agri-businesses entering this field has led to a number of celebrated conflicts with local farmers, and has become a burning political issue.

In any case, this attempt of the government to expand the area under "economic forests" has led it to attempt the regulation of land use on economic grounds, something it has never done on such a massive scale. It is doubly unfortunate that this attempt should be based on such economic and environmental grounds, and, worse, that in some cases, agribusinesses were given the task of evicting the squatters who were not doing anything better or worse than those who are evicting them.

Irrigation: Before 1980, probably the largest impact of government action on agricultural production would be felt through its

decisions on irrigation investments. The objectives of the Thai government in making these investments are far from clear. We can say what they are not. As an exporter of rice, the government certainly had little drive to attain self-sufficiency, as is the case with Indonesia, the Philippines or other importers, although admittedly, changes in the world rice does have some impact on the pace of investments (thus investments fell in 1969-1971 and in 1982-1985 when rice prices were very low). Had the need to maximize production been the motive force, the government would have concentrated singlemindedly on areas with the greatest potential. To be sure, availability of good sites from an engineering point of view would have meant favoring the better off areas in any case. Thus the government invested massively in the Central plains, in a continuing effort that began when the Dutch engineer J. Homan van der Heide proposed the project in 1907. With the completion of the Chao Phraya and the associated Mae Klong and Pitsanuloke projects, the central system has reached a plateau of development from an engineering point of view.

With this halt in its central system, the government's position on irrigation development has become even more ambivalent. Much of the more recent investments have gone into small-scale systems. In this the government is guided by equity considerations, notwithstanding the fact that the productivity of these investments appears at best dubious.

Another area of undoubted weakness is the failure to increase the efficiency of the existing systems. Even though the Central system is

now used to its capacity in the dry season in the sense that the main constraint to dry-season rice production is the availability of water, there is considerable wastage involved. Unpredictable flows have led to inefficient use of water, but more than that, they have led upstream farmers to hoard water, reducing supplies downstream where its productivity would be higher. Furthermore, much of the structures were designed with rice producation in mind, and the regulation system still assumes that water will be used for rice production, in actual practice, much of the irrigated areas have been put to other uses, such as horticulture and aquaculture. This shift in land use however has had little impact on the Royal Irrigation Department's (RID) operations. However, a rethinking of the RID in this matter would have profound implications. In the past, the government has seldom intervened in the farmers' use of his land. A regulatory system with a variegated cropping pattern would be nearly impossible. But if the farmers and RID wish to move away from rice and to have the water delivery schedule shifted to take account of this fact, a different arrangement from the present, generally hands-off attitude, is called for. Such a new arrangement could take many forms, but will require stronger management and organizational skills of both the RID and the farmers.

Credit: As indicated above, the government has intervened in order to make cheap, institutional credit available to farmers. From the point of view of the farmers, the partial replacement of the informal sources by institutional sources brought about by these policies has been clearly and substantially beneficial. The question is whether the implicit subsidization that has undoubtedly taken place

has been larger than is justifiable. The following reports on an attempt to calculate the subsidy element (Siamwalla and Nettayarak 1990).

Three modes of intervention have been used, which implies a subsidization of credit in one form or another:

- Commercial banks are required to lend a proportion, now set at 14% of its deposits to the agricultural sector;

- The BAAC has chosen to use an average-cost pricing rather than the marginal-cost pricing rule in its setting of interest rates to be charged to the farmers; and

- Since 1987, the government has introduced a paddy mortgage scheme which gives a highly subsidized loan to farmers to store their paddy till later in the marketing season.

These policies together have meant an implicit subsidy of the agricultural sector of the order of 1 billion baht (US$ 40 million) in 1987, or less than 1% of the value-added in the agricultural sector. Of this total, the lion's share (about three-quarters) of the subsidies is through the second mode of intervention.

Pricing policies: The most powerful instruments applied to agriculture in the past have been the various border measures applied mostly against agricultural exports, but more recently also against agricultural imports as well. A fuller account of the policies against most of the major agricultural exports is available elsewhere

(Siamwalla and Setboonsarng 1989), and therefore only a sketch of it will be given here.

There appears to be a clear trend in government intervention measures. Agricultural tended to be taxed much more heavily in the past, with rice singled out as the main disprotected item. Another old export item was also heavily taxed, namely rubber. Most of the newer export items were lightly treated. In all cases the taxes were such as to reduce the variability of domestic prices, with the taxes being high when world prices were high as for example in 1973-74.

Sugar was exceptionally treated by having its domestic price to consumers being maintained at a higher level than the world price in order to subsidize exports. Significantly, sugar used to be imported until as recently as 1959, and the industry would remain an importable had free trade prevailed until the late 1960s. The protective policies normal to importables in Thailand thus carried over even after sugar has clearly become an exportable (i.e. it would still be exported if the government ceased to support it) from about the mid-1970s onward.

The peak years of heavy anti-agriculture bias were the late 1970s and the early 1980s. Starting from about 1982 onwards, disprotection of the exportable items steadily declined: maize export was completely liberalized at the end of 1981, all taxation of rice exports were removed in 1986, and taxation of rubber was gradually reduced and temporarily removed altogether in 1989. At the same time another exportable commodity, cassava, joined sugar in receiving protective treatment. Here the government dissipates the quota rent it receives

as a result of the voluntary restraint agreement with the European Community (EC) in favor of higher exports to non-EC markets, thus boosting demand and domestic prices.

This trend away from disprotection can be variously explained. The dismantling of the export taxes in the 1980s is in line with the implicit policy of stabilizing domestic prices. However, when agricultural (particularly rice) prices spurted upwards again in 1987-1989, the neutral policies remained in place. These events appear to be the strongest confirmation of the alternative hypothesis that the political economy of agricultural pricing policies has indeed begun to shift in favor of agriculture, and that the pro-farmer rhetoric of the post-1973 is at last beginning to be implemented.

Table 9 shows the nominal protection coefficients for eight crops, both exportables and importables, from 1970 to 1986. Other than confirming the decline in the disprotection of the exportable sector, the table also shows that the protection rates for importables (except cotton) have been rising.

Among nontradables, there have been for a long time what appears to be very stringent regulations on slaughtering of swine and cattle. Thus a slaughter house cannot be privately owned. Live animals and meat transport across provincial boundaries have to be licensed by local authorities, and at times altogether banned. An imputed income tax is collected with the slaughtering permit, which is issued for each individual animal. The combined result of these regulations and taxation is that considerable illegal slaughtering takes place, usually under unsanitary conditions. In more recent years, these

TABLE 9

EFFECT OF DIRECT INTERVENTION ON THE AGRICULTURAL SECTOR
ON DOMESTIC RELATIVE PRICES OF SELECTED AGRICULTURAL COMMODITIES 1970-1986

(Proportionate Deviation from Real World Price)

YEAR	RICE	MAIZE	SUGAR			RUBBER	CASSAVA	COTTON	SOYBEAN	PALM OI
			GROWER	MILLER	CONSUMER					
1970	-0.1829	-0.0268	0.2382	0.4085	0.4939	-0.1303	0.0000	1.1780	NA	N
1971	-0.2583	-0.0358	0.0216	0.2799	0.4287	-0.1058	0.0000	1.1658	NA	N
1972	-0.2682	0.0622	-0.2201	0.0252	0.1451	-0.1101	0.0000	1.0385	NA	N
1973	-0.4044	-0.0971	-0.2932	-0.1114	-0.1547	-0.1712	0.0000	1.1054	NA	N
1974	-0.4755	-0.0258	-0.6224	-0.4092	-0.5605	-0.1888	0.0000	0.3104	NA	N
1975	-0.3176	-0.0650	-0.5578	-0.4082	-0.6353	-0.1661	0.0000	0.4198	NA	N
1976	-0.1576	-0.0327	-0.2078	-0.1127	-0.2495	-0.2083	0.0000	0.1774	-0.0753	N
1977	-0.2199	0.0033	-0.0256	-0.0280	-0.1067	-0.2228	0.0000	0.0258	0.1824	-0.01
1978	-0.3163	-0.0229	0.3491	0.0423	0.1462	-0.2275	0.0000	0.1001	0.1550	-0.03
1979	-0.2392	-0.0461	0.3921	0.1047	0.2117	-0.2449	0.0000	0.0740	0.1688	-0.07
1980	-0.2611	-0.0545	-0.0282	0.2105	0.3565	-0.2611	0.0000	0.0870	0.1398	-0.08
1981	-0.2573	-0.0873	-0.1017	-0.0093	-0.0057	-0.1890	0.0000	0.0301	0.1183	0.00
1982	-0.1155	0.0000	0.3609	0.0841	0.6005	-0.1312	0.0000	0.0254	0.2886	0.07
1983	-0.0805	0.0000	0.5158	0.3512	1.3564	-0.1795	0.0000	0.3791	0.2455	0.09
1984	-0.0611	0.0000	0.5310	0.4857	1.2781	-0.1509	-0.0034	0.2234	0.2606	-0.13
1985	-0.0442	0.0000	0.9672	0.2380	1.8829	-0.1056	-0.1734	0.4538	0.1553	-0.11
1986	0.0030	0.0000	0.8085	0.0632	1.6537	-0.1107	-0.2082	0.6423	0.3413	0.31

Note : For rice and cassava for which Thailand is not a small country,
the deviation is from the world price as it would be
if Thailand unilaterally eliminates its intervention.

Source : Siamwalla and Setboonsarng (1989) for rice, maize, sugar and rubber
and for the period 1970-1985;
additional calculations made for the remaining commodities and for 1986.

regulations are being relaxed, in the interest of promoting exports, particularly of pork.

We close this account of pricing policies by providing some estimates of the indirect effects of nonagricultural policies on the relative prices received by the farmers. The method of calculation is given in detail in Siamwalla and Setboonsarng (1989), and is based on the methodology developed by Krueger, Schiff and Valdes (1988). Briefly, a policy of industrial protection is an implicit tax on exportables. The size of this implicit tax could be calculated as the extent of devaluation of the real exchange rate necessary if the industrial protection is removed. For most of the period lasting from the 1960s onwards, the degree of implicit export tax is about 10%. In addition, when the government had a sizable macroeconomic imbalance as it did in the early 1980s, and decide to meet such imbalance, not by devaluation, but by unsustainable borrowing from abroad, then during that period, there is an additional implicit taxation on exports as well: in the early 1980s it was of the order of about 10-15%. These implicit taxes combined therefore add up to a sizable amount and exceeded, for that period, the direct imposts of the government on agricultural exports (compare Table 10 with Table 9).

WHITHER THAI AGRICULTURE?

Thai agriculture is now at a crossroads. The two factors that have fuelled its growth in the past can no longer be called on in the future. These are surplus land and a buoyant foreign market. While Thailand will still have comparative advantage in agriculture, the sector's dominance in the economy and in exports will continue to

TABLE 10

COMBINED EFFECT OF INTERVENTION IN THE AGRICULTURAL AND NONAGRICULTURAL SECTORS AND OF MACROECONOMIC IMBALANCES ON RELATIVE PRICES OF AGRICULTURAL COMMODITIES

(Proportionate Deviation from Real World Price)

YEAR	RICE	MAIZE	SUGAR			RUBBER	CASSAVA	COTTON	SOYBEAN	PALM OIL
			PRODUCER	MILLER	EXPORTER					
1970	-0.3470	-0.2223	-0.0105	0.1256	0.1938	-0.3050	-0.2012	0.7730	NA	NA
1971	-0.4006	-0.2208	-0.1744	0.0344	0.1547	-0.2774	-0.1922	0.7225	NA	NA
1972	-0.3642	-0.0773	-0.3224	-0.1094	-0.0052	-0.2269	-0.1317	0.7053	NA	NA
1973	-0.4619	-0.1842	-0.3613	-0.1971	-0.2363	-0.2512	-0.0966	0.8164	NA	NA
1974	-0.4994	-0.0702	-0.6396	-0.4362	-0.5806	-0.2258	-0.0453	0.2346	NA	NA
1975	-0.4266	-0.2143	-0.6284	-0.5027	-0.6936	-0.2993	-0.1617	0.2315	NA	NA
1976	-0.2835	-0.1773	-0.3262	-0.2454	-0.3617	-0.3267	-0.1518	0.0280	-0.1926	NA
1977	-0.3907	-0.2165	-0.2390	-0.2409	-0.3024	-0.3931	-0.2211	-0.1540	-0.0249	-0.1916
1978	-0.4517	-0.2165	0.0818	-0.1642	-0.0809	-0.3806	-0.2000	-0.0776	-0.0315	-0.1942
1979	-0.4148	-0.2663	0.0707	-0.1503	-0.0680	-0.4192	-0.2317	-0.1200	-0.0423	-0.2434
1980	-0.4045	-0.2379	-0.2168	-0.0244	0.0933	-0.4045	-0.1954	-0.1210	-0.0783	-0.2576
1981	-0.4171	-0.2837	-0.2950	-0.2225	-0.2197	-0.3635	-0.2138	-0.1829	-0.1130	-0.2067
1982	-0.2565	-0.1594	0.1440	-0.0887	0.3454	-0.2697	-0.1604	-0.1308	0.0923	-0.0917
1983	-0.3015	-0.2403	0.1516	0.0265	0.7902	-0.3767	-0.2416	0.0802	-0.0245	-0.1436
1984	-0.2517	-0.2030	0.2202	0.1841	0.8156	-0.3233	-0.2023	-0.0034	0.0269	-0.2990
1985	-0.2203	-0.1843	0.6047	0.0099	1.3517	-0.2704	-0.1492	0.2160	-0.0336	-0.2627
1986	-0.0888	-0.0915	0.6430	-0.0341	1.4109	-0.1920	-0.0446	0.4921	0.2186	0.1971

Note : For rice and cassava for which Thailand is not a small country, the deviation is from the world price as it would be if Thailand unilaterally eliminates its intervention.

Source : Siamwalla and Setboonsarng (1989) for rice, maize, sugar and rubber and for the period 1970-1985 with some minor adjustments; additional calculations made for the remaining commodities and for 1986.

decline. It will have to compete with the manufacturing sector even for that factor of production which it seems to have in abundance: labor. Current prognosis is for the labor force in agriculture to decline absolutely sometimes in the 1990s.

These developments, as well as the need to cope with the legacy of inadequate land policies in the past, impose a set of delicate issues for the government. First of all, the factor-intensity within Thai agriculture will undergo rather complicated changes, as first the older trend of decreasing man-land ratio will have to be coped with, followed soon by a reversal of that trend. At the same time, domestic demand will dictate that the more capital-intensive and technology-intensive horticultural sector will have to expand. Thailand also has begun to show promise as an exporter of horticultural and livestock products. Whether it can maintain that status in the face of rapidly increasing domestic demand and what government trade policy should be to accommodate both the domestic and foreign needs are issues that need answers.

Public policy towards agriculture will thus have to address very different issues. No longer can the government be content to let the farmers grow any crop (on whatever land), have middlemen transport it to Bangkok and then collecting a toll only when it is exported. Some of the issues confronting Thai agriculture now require a very different organizational framework from what the sector has inherited. The government itself will have to reexamine its legal and regulatory framework and its own role in it.

REFERENCES

Akrasanee, Narongchai (1983). Rural Off-farm Employment in Thailand: Summary Report ans synthesis of the Rural Off-farm Assessment Project. Bangkok, Industrial Management Consultants.

Arbhabhirama, Anat, Dhira Phantumvanit, John Elkington and Phaitoon Ingkasuwan (eds.) (1987). **Thailand Natural Resources Profile.** Bangkok, Thailand Development Research Institute.

Barker, Randolph, Robert W. Herdt and Beth Rose (1985). **The Rice Economy of Asia.** Washington DC, Resources for the Future.

Busayawit, Sunee (1978). **A Comparison of Costs of Sugarcane Cutting by means of Labor and by means of Machines: with special reference to the Western Region of Thailand.** M.Econ. thesis, Faculty of Economics, Thammasat University (in Thai).

Feder, Gershon, Tongroj Onchan, Yongyuth Chalamwong and Chira Hongladarom (1988). **Land Policies and Farm Productivity in Thailand.** Baltimore, MD. Johns Hopkins University Press.

Jessadachatr, Phitsanes (1977). **A History of Sugar Policies in Thailand: 1937-75.** M.Econ. thesis, Faculty of Economics, Thammasat University.

Krueger, Anne O., Maurice Schiff and Alberto Valdes (1988). "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economywide Policies." **The World Bank Economic Review**, Vol.2 No.3 (September): 255-271

Moerman, Michael (1968). **Agricultural Change and Peasant Choice in a Thai Village.** Berkeley, CA. University of California Press.

Patamasiriwat, Direk and Sakeddao Suewattana (1990). "Sources of Growth of Agricultural Production 1965-1985: Analysis based on TDRI model." **Warasarn Settasat Thammasat**, Vol.8 No.1 (March): 43-69.

Pinthong, Chirmsak (1977). **A Price Analysis of the the Thai Rice Marketing System.** Ph.D. thesis. Stanford University.

Setboonsarng, Suthad, Boonjit Titapiwatanakun and Somnuk Tubpun (1989). **Competitiveness of Animal Feed and Livestock Production in Thailand.** Bangkok, Thailand Development Research Institute.

Siamwalla, Ammar (1978). "Farmers and Middlemen: Aspects of Agricultural Marketing in Thailand." **Economic Bulletin for Asia and the Pacific**, Vol.29, No.1 (June): 38-50

Siamwalla, Ammar (ed.) (1990). **Credit in Rural Thailand.** Bangkok, Thailand Development Research Institute (in Thai).

Siamwalla, Ammar and Viroj Na Ranong (1990). **Factbook on Rice.** Bangkok, Thailand Development Research Institute (in Thai).

Siamwalla, Ammar and Prayong Nettayarak (1990). "Estimating the Cost of Subsidies for Agricultural Credit". (mimeo). Bangkok, Thailand Development Research Institute.

Siamwalla, Ammar and Suthad Setboonsarng (1989). **Trade, Exchange Rate and Agricultural Pricing Policies in Thailand.** Comparative Studies on the Agricultural Pricing Policy. Washington DC, World Bank.

TDRI (Thailand Development Research Institute) (1986). **Land Policy Study, Volume 5: Land Tenure Policy (Land Rights and Land Titling).** Bangkok, Thailand Development Research Institute (in Thai).

Rajapark Building, 163 Asoke, Sukhumvit Road, Bangkok 10110 Thailand

Tel. 258-9012-7, 258-9027-9 Fax. 258-9046 Telex 20666 Rajapak TH

This work is licensed under a
Creative Commons
Attribution – NonCommercial - NoDerivs 3.0 License.

To view a copy of the license please see:
http://creativecommons.org/licenses/by-nc-nd/3.0/

This is a download from the BLDS Digital Library on OpenDocs
http://opendocs.ids.ac.uk/opendocs/

Institute of Development Studies